



Duke Energy Utility-Scale PV Interconnection Commissioning FAQ

Important Updates: Advanced Energy would like to share some new information regarding the interconnection commissioning process:

- To most effectively manage end of year demand, Advanced Energy has revised the current medium voltage (MV) audit request system. The new system includes three or four time slots for MV audits in each two-week period from August 21 to October 27. To give all customers a fair chance to make initial requests, Advanced Energy will process all slot requests received by **August 4** as a batch. Remaining slots will then be filled on a first-come, first-served basis.
- The interconnection commissioning process, from MV audit to passing the anti-islanding test, typically takes approximately two months (with some sites taking three months or more). Advanced Energy highly recommends that sites attempting to come online in 2017 have their MV audit site visit completed as soon as possible, and no later than the end of October.
- Customers will be charged for the interconnection commissioning through Duke Energy. In the future, customers may be billed directly by Advanced Energy.
- The site commissioning fee is charged on a time and materials basis and ranges from \$10,000 to over \$20,000 per project.

Background: In June 2016, Duke Energy began requiring all distribution-interconnected PV projects 1 MW and larger to complete PV interconnection commissioning. Effective March 1, 2017, Advanced Energy began serving as the interconnection commissioning agent for Duke Energy distribution-interconnected customers. PV interconnection commissioning includes two main components: an on-site MV audit and an on-site anti-islanding test.

What type of sites must complete the PV interconnection commissioning by Advanced Energy?

Commissioning is required for distribution-interconnected solar facilities 1 MW or larger that are located in NC and SC Duke Energy Carolinas (DEC) and Duke Energy Progress (DEP) territories. Net-metered systems are not subject to this commissioning process.



What is a medium voltage (MV) audit?

The purpose of the MV audit is to determine if the customer's MV and inverter AC construction are installed in accordance with the following minimum requirements:

- Duke Energy's distribution construction standards*
- The approved project documentation on file with Duke Energy
- Inverter manufacturer installation requirements
- IEEE 1547 and 1547.1
- National Electrical Code

An engineering report will be provided detailing any site corrections that must be made to comply with the required standards. The project must satisfactorily make these corrections to complete the interconnection commissioning process.

*Note: Duke Energy's distribution construction standards are only available through Duke Energy's online contractor portal. Duke Energy will provide each project developer a single login credential to this portal, which may be shared with subcontractors. Project developers in need of a login credential should contact their Duke Energy account representative.

What construction needs to be complete in order to conduct an MV audit?

The customer's MV and inverter AC construction must be complete in order to conduct the MV audit. The DC portion of the project does not need to be complete at the time of the MV audit. To facilitate interconnection, Advanced Energy strongly encourages customers to complete MV construction and the MV audit as early as possible.

Who needs to be on site for the MV audit?

A customer representative who has knowledge of the MV equipment specifications and installation must be on site for the MV audit site visit. It is encouraged to have the MV contractor on site for the MV audit.

What is an anti-islanding test?

The purpose of the anti-islanding (cease to energize) test is to determine if the PV facility meets the Duke Energy and IEEE 1547 and 1547.1 timing requirements for:

- Ceasing to energize when an open phase condition is present
- Restarting/reconnecting once utility power is restored

The scope of the anti-islanding test site visit is to:

- Confirm required MV audit corrections have been made
- Confirm inverter set points are in accordance with the Interconnection Agreement
- Conduct anti-islanding test (single phase and three phase) with assistance from Duke Energy and the customer



Who needs to be on site for the anti-islanding test?

- Personnel with knowledge of the MV audit corrections
- Personnel authorized to operate customer-owned MV switching equipment
- Personnel authorized to operate the inverters (for verifying inverter set points)
- It is encouraged to have the MV contractor and an inverter manufacturer technician on site in case minor changes are required before or during testing.

How long does an MV audit and anti-islanding test take?

An MV audit usually takes half a day, but can take up to a full day. This time frame is similar for the anti-islanding test. These times can vary depending on the complexity and number of issues found during the site visits. MV audits are scheduled Monday through Friday. Anti-islanding tests are scheduled Monday through Thursday.

What happens after the MV audit?

Shortly following the MV audit, Advanced Energy will provide notification of the general results of the audit to the customer and the Duke Energy account manager. This notification will indicate whether the site is safe to conditionally energize for customer inverter commissioning. Two to four weeks after the MV audit, the customer will receive a detailed engineering report with photos and standards references for all required MV corrections.

If the site is deemed unsafe to energize because of issues found during the MV audit, those unsafe issues must be corrected before the site can be energized. In some cases, quality photos may be used to verify corrections have been satisfactorily made. However, an MV re-audit may be required for Advanced Energy to verify the corrections.

An anti-islanding test will be conducted once all MV corrections are made and inverter commissioning is complete.

What happens if I need an MV re-audit?

Based on the concerns raised from the MV audit, an MV re-audit may be necessary. The re-audit will have to be completed prior to Advanced Energy notifying Duke Energy that it is safe to conditionally energize the site (for the purpose of inverter commissioning).



How do I initiate the interconnection commissioning process?

To most effectively manage end of year demand, Advanced Energy has revised the current MV audit request system. The new system includes three or four time slots for MV audits in each two-week period from August 21 to October 27. Slots are for MV audits only. Anti-islanding tests will be scheduled separately as sites progress through the commissioning process.

Customers initiate the interconnection commissioning process by going through the following steps:

1. Customers must contact Advanced Energy to request one of the two-week periods listed below for each site's MV audit:

| Time Period | Slot #1 | Slot #2 | Slot #3 | Slot #4 |
|--------------|---------|---------|---------|---------|
| Aug 21-Sep 1 | | | | |
| Sep 4-15 | | | | |
| Sep 18-29 | | | | |
| Oct 2-13 | | | | |
| Oct 16-27* | | | | |

* Sites are welcome to request an MV audit after October 27 (assuming Advanced Energy availability), but they are unlikely to complete MV commissioning before to the end of the year.

To give all customers a fair chance to request time periods, **Advanced Energy will accept initial requests through August 4**. As quickly as possible, Advanced Energy will process this batch of requests and assign appropriate time slots. Any time slots remaining after these initial assignments will be available on a first-come, first-served basis. The following information must be provided in order to request a time period:

- Site name
 - Site address and map coordinates (if available)
 - AC capacity
 - Duke Energy account manager
 - Requested time period for MV audit
2. Advanced Energy will contact Duke Energy to request the current site documentation. Customers are required to have the following up-to-date site documentation on file with Duke Energy:
 - a. Duke Energy-approved single line diagram (SLD) matching the as-built project
 - b. Duke Energy-approved Interconnection Request matching the as-built project
 - c. Signed Interconnection Agreement

Please note that non-approved site documentation has been a significant cause of delay in some projects. For example, changes to inverter or transformer type or size from initial SLD and interconnection request must be submitted to Duke Energy for formal review and approval.



3. Advanced Energy will contact the customer to schedule a specific date and time for the MV audit after approved site documentation is on file. If Advanced Energy has not received approved documentation from Duke Energy two weeks before the requested time period, Advanced Energy reserves the right to schedule the site in a later time period.

What if the time period I want is not available?

If a customer requests a time period that is not available, Advanced Energy will place the customer in the next available time period. If all remaining time periods are filled, the site will be placed on a waitlist. As soon as an open slot is available, Advanced Energy will contact those on the waitlist to fill the slot. The number of sites that Advanced Energy is able to commission in 2017 depends greatly on the quality of MV construction. If most sites are found to require few corrections, then Advanced Energy may be able to open up additional commissioning slots later in the year. Advanced Energy will try to accommodate any requests; however, there is no guarantee that commissioning for all sites will be completed in the requested time frame.

What if I cancel a time slot or site visit?

Sites that cancel will be rescheduled to the next available time slot or site visit date, which could be many weeks away. Any site visit that is canceled less than 1 week before the scheduled date may incur a \$1,000 cancellation fee.

How do I get in contact with Advanced Energy?

Please contact Advanced Energy directly, preferably via email (solarcommissioning@advancedenergy.org) or phone (919.857.9009).

How long does the commissioning process typically take?

The interconnection commissioning process, from MV audit to passing the anti-islanding test, typically takes approximately two months (with some sites taking three months or more). Timing greatly depends on quality of construction and whether MV re-audits or additional anti-islanding tests are needed. The time frame also depends on the availability of Advanced Energy, the customer and Duke Energy staff.

Is there a guarantee that Advanced Energy will be able to commission my site in time to be online by the end of 2017?

Advanced Energy will try to accommodate any request that comes through; however, we cannot guarantee that every site will be commissioned in the requested time frame or by the end of the year. If you are attempting to have the site online before the end of 2017, we highly recommend having your MV audit as soon as possible, and no later than the end of October. However, we cannot guarantee that a particular site will be completed by the end of 2017.



Do I have to pay for the commissioning, and how much will it cost?

Yes, the customer will pay for the cost of the interconnection commissioning. The customer will be billed by Duke Energy for the commissioning cost. In the future, the customer may be billed directly by Advanced Energy. Advanced Energy is currently charging on a time and material basis, which can vary between \$10,000 to \$20,000 (or more) per project. Costs are mostly driven by non-compliant construction or problems during anti-islanding testing. Advanced Energy and Duke Energy expect the cost of each site commissioning will decrease over time as developers improve compliance with Duke Energy's minimum construction standards.